

APPENDIX B **INSTALLATION INSTRUCTIONS**

CS-KE12NB41 & CZ-18BT1U + CU-KE12NK1
CS-KE18NB4UW & CZ-18BT1U + CU-KE18NKU

(852-6-4190-577-00-2)

INSTALLATION INSTRUCTIONS

Split System Air Conditioner

This air conditioner uses the refrigerant R410A.

NOTE External diameter of service port R410A: 5/16"

Panasonic®

Contents

Model Combinations	
Combine indoor and outdoor units only as listed below.	
Model No.	
Indoor Unit	Outdoor Unit
CS-KE12NB41	CU-KE12NK1
Power Source:	
60 Hz, single-phase, 115 V	
CS-KE18NB4UW	CU-KE18NKU
Power Source:	
60 Hz, single-phase, 230/208 V	
Ceiling Panel	
CZ-18BT1U	

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IMPORTANT!

Please Read Before Starting

This air conditioning system meets strict safety and operating standards. As the installer or service person, it is an important part of your job to install or service the system so it operates safely and efficiently.

For safe installation and trouble-free operation, you must:

- Carefully read this instruction booklet before beginning.
- Follow each installation or repair step exactly as shown.
- Observe all local, state, and national electrical codes.
- Pay close attention to all warning and caution notices given in this manual.



WARNING

This symbol refers to a hazard or unsafe practice which can result in severe personal injury or death.



CAUTION

This symbol refers to a hazard or unsafe practice which can result in personal injury or product or property damage.

If Necessary, Get Help

These instructions are all you need for most installation sites and maintenance conditions. If you require help for a special problem, contact our sales/service outlet or your certified dealer for additional instructions.

In Case of Improper Installation

The manufacturer shall in no way be responsible for improper installation or maintenance service, including failure to follow the instructions in this document.

SPECIAL PRECAUTIONS



ELECTRICAL SHOCK CAN CAUSE SEVERE PERSONAL INJURY OR DEATH. ONLY A QUALIFIED, EXPERIENCED ELECTRICIAN SHOULD ATTEMPT TO WIRE THIS SYSTEM.

- Do not supply power to the unit until all wiring and tubing are completed or reconnected and checked.
- Highly dangerous electrical voltages are used in this system. Carefully refer to the wiring diagram and these instructions when wiring. Improper connections and inadequate grounding can cause **accidental injury or death**.
- **Ground the unit** following local electrical codes.
- Connect all wiring tightly. Loose wiring may cause overheating at connection points and a possible fire hazard.
- To prevent possible hazards from insulation failure, the unit must be grounded.



When Transporting

Be careful when picking up and moving the indoor and outdoor units. Get a partner to help, and bend your knees when lifting to reduce strain on your back. Sharp edges or thin aluminum fins on the air conditioner can cut your fingers.

When Installing...

Select an installation location which is rigid and strong enough to support or hold the unit, and select a location for easy maintenance.

...In a Ceiling or Wall

Make sure the ceiling/wall is strong enough to hold the unit's weight. It may be necessary to construct a strong wood or metal frame to provide added support.

...In a Room

Properly insulate any tubing run inside a room to prevent "sweating" that can cause dripping and water damage to walls and floors.



CAUTION

Keep the fire alarm and the air outlet at least 1.5 m away from the unit.

...In Moist or Uneven Locations

Use a raised concrete pad or concrete blocks to provide a solid, level foundation for the outdoor unit. This prevents water damage and abnormal vibration.

...In an Area with High Winds

Securely anchor the outdoor unit down with bolts and a metal frame. Provide a suitable air baffle.

...In a Snowy Area (for Heat Pump-type Systems)

Install the outdoor unit on a raised platform that is higher than drifting snow. Provide snow vents.

When Connecting Refrigerant Tubing



WARNING

- When performing piping work do not mix air except for specified refrigerant (R410A) in refrigeration cycle. It causes capacity down, and risk of explosion and injury due to high tension inside the refrigerant cycle.
- Refrigerant gas leakage may cause fire.
- Do not add or replace refrigerant other than specified type. It may cause product damage, burst and injury etc.
- Ventilate the room well, in the event that refrigerant gas leaks during the installation. Be careful not to allow contact of the refrigerant gas with a flame as this will cause the generation of poisonous gas.

- Use the flare method for connecting tubing.
- Apply refrigerant lubricant to the matching surfaces of the flare and union tubes before connecting them, then tighten the nut with a torque wrench for a leak-free connection.
- Check carefully for leaks before starting the test run.
- Do not leak refrigerant while piping work for an installation or re-installation, and while repairing refrigeration parts. Handle liquid refrigerant carefully as it may cause frost-bite.

When Servicing

- Turn the power OFF at the main power box (mains) before opening the unit to check or repair electrical parts and wiring. 
- Keep your fingers and clothing away from any moving parts.
- Clean up the site after you finish, remembering to check that no metal scraps or bits of wiring have been left inside the unit being serviced.

Others



- Ventilate any enclosed areas when installing or testing the refrigeration system. Escaped refrigerant gas, on contact with fire or heat, can produce dangerously toxic gas.
- Confirm upon completing installation that no refrigerant gas is leaking. If escaped gas comes in contact with a stove, gas water heater, electric room heater or other heat source, it can produce dangerously toxic gas.
- Do not touch the air inlet or the sharp aluminum fins of the outdoor unit. You may get injured.
- Do not sit or step on the unit, you may fall down accidentally.
- Do not stick any object into the FAN CASE. You may be injured and the unit may be damaged.



NOTE

The illustrations are based on the typical appearance of a standard model. Consequently, the shape may differ from that of the air conditioner that you are installing.

1. General

This booklet briefly outlines where and how to install the air conditioning system. Please read over the entire set of instructions for the indoor and outdoor units and make sure all accessory parts listed are with the system before beginning.

1-1. Tools Required for Installation (not supplied)

1. Standard screwdriver	6. Sabre saw or key hole saw	11. Tube cutter
2. Phillips head screwdriver	7. Hacksaw	12. Tube flaring tool
3. Knife or wire stripper	8. Core bits	13. Torque wrench
4. Tape measure	9. Hammer	14. Adjustable wrench
5. Carpenter's level	10. Drill	15. Reamer (for deburring)

1-2. Accessories Supplied with Unit

Table 1

Parts	Figure	Q'ty	Remarks	Parts	Figure	Q'ty	Remarks			
Washer		8	For temporarily suspending indoor unit from ceiling	Truss head screw	 3/16×13/32" (5×10mm)	4	For full-scale installation diagram			
Flare insulation	 1/8"(T3) 3/16"(T5)	2 set	For wide / narrow tube connection	Drain hose	 5-1/2"(L140)	1	For unit & PVC tube connection			
Insulation tape	 3/32"(T2)	2	For wide / narrow tube / flare nut connection	Hose band		2	For drain hose connection			
Vinyl tie		8	For flare / drain insulating connection	Tapping screw	 Truss-head Phillips 5/32×5/8" (4×16mm)	2				
Drain hose insulation	 13/32"(T10)	1	For drain tube connection	Cushion rubber		4	Packed in the outdoor unit			
Remote controller		1		Truss head screw	 5/32×15/32" (4×12mm)	4	Packed in the ceiling panel			
Remote control holder		1		Special screw	 3/16×1-9/16" (5×40mm)	4				
AAA alkaline battery		2		<ul style="list-style-type: none"> • Use M10 or 3/8" for suspension bolts. • Suspension bolts and nuts (locally purchased) 						
Full-scale installation diagram		1	Printed on container box							

1-3. Optional Copper Tubing Kit

Copper tubing for connecting the outdoor unit to the indoor unit is available in kits which contain the narrow and wide tubing, fittings and insulation. Consult your nearest sales outlet or air conditioning workshop.

1-4. Type of Copper Tube and Insulation Material

If you wish to purchase these materials separately from a local source, you will need:

1. Deoxidized annealed copper tube for refrigerant tubing as detailed in Table 2.
Cut each tube to the appropriate lengths 1' to 1'4" (30 cm to 40 cm) to dampen vibration between units.
2. Foamed polyethylene insulation for the specified copper tubes as required to precise length of tubing. Wall thickness of the insulation should be not less than 5/16" (8 mm).
3. Use insulated copper wire for field wiring. Wire size varies with the total length of wiring. Refer to 3-7. Wiring Instructions for details.



CAUTION

Check local electrical codes and regulations before obtaining wire. Also, check any specified instructions or limitations.

Table 2

Model	Narrow Tube		Wide Tube	
	Outer Dia.	Thickness	Outer Dia.	Thickness
CS-KE12NB41	1/4" (6.35 mm)	0.0314" (0.8 mm)	3/8" (9.52 mm)	0.0314" (0.8 mm)
CS-KE18NB4UW	1/4" (6.35 mm)	0.0314" (0.8 mm)	1/2" (12.70 mm)	0.0314" (0.8 mm)

1-5. Additional Materials Required for Installation

1. Refrigeration (armored) tape
2. Insulated staples or clamps for connecting wire
(See local codes)
3. Putty
4. Refrigeration lubricant
5. Clamps or saddles to secure refrigerant tubing

2. Installation Site Selection

2-1. Indoor Unit



WARNING

To prevent abnormal heat generation and the possibility of fire, do not place obstacles, enclosures and grilles in front of or surrounding the air conditioner in a way that may block air flow.

AVOID:

- direct sunlight.
- nearby heat sources that may affect performance of the unit.
- areas where leakage of flammable gas may be expected.
- places where large amounts of oil mist exist.

DO:

- select an appropriate position from which every corner of the room can be uniformly cooled.
- select a location that will hold the weight of the unit.
- select a location where tubing and drain hose have the shortest run to the outside.
- allow room for operation and maintenance as well as unrestricted air flow around the unit. (Fig. 1)
- install the unit within the maximum elevation difference (H) above or below the outdoor unit and within a total tubing length (L) from the outdoor unit as detailed in Table 3 and Fig. 2.
- install the indoor unit more than 3.3' (1 m) away from any antenna or power lines or connecting wires used for television, radio, telephone, security system, or intercom. Electrical noise from any of these sources may affect operation.

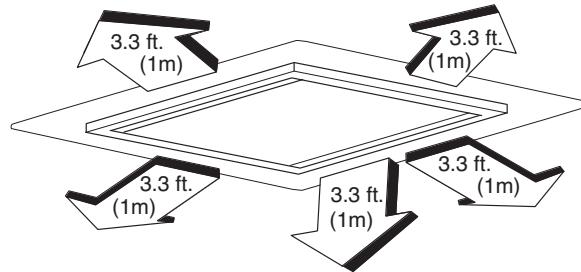


Fig. 1

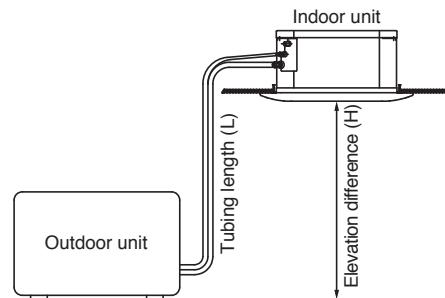


Fig. 2



CAUTION

Air delivery will be degraded if the distance from the floor to the ceiling is greater than 10 ft. (3 m).

Table 3

Model	Max. Allowable Tubing Length at Shipment (ft.)	Limit of Tubing Length (L) (ft.)	Limit of Elevation Difference (H) (ft.)	Required Amount of Additional Refrigerant (oz./ft.)*
CS-KE12NB41	25	65	23	0.16
CS-KE18NB4UW	25	100	50	0.27

* If total tubing length becomes 25 to 65 ft. (Max.) or 25 to 100 ft. (Max.), charge additional refrigerant (R410A) by 0.16 or 0.27 oz./ft. No additional charge of compressor oil is necessary. For more detailed charging information, refer to the Technical & Service Manual.

2-2. Outdoor Unit

AVOID:

- heat sources, exhaust fans, etc. (Fig. 3)
- damp, humid or uneven locations.

DO:

- choose a place as cool as possible.
- choose a place that is well ventilated.
- install in a location where at least two sides are unobstructed, so that the flow of air at the intake port or exhaust port is not blocked, and so that sufficient space is ensured for maintenance to be carried out without trouble. In general the top also must be unobstructed. (Figs. 4a and 4b)
- provide a solid base (level concrete pad, concrete block, 4" x 1'4" (10 x 40 cm) beams or equal), a minimum of 4" (10 cm) above ground level to reduce humidity and protect the unit against possible water damage and decreased service life. (Figs. 5a and 5b)



CAUTION

A solid base must not cover the hole of the bottom plate.

- install cushion rubber under unit's feet to reduce vibration and noise. (Fig. 5c)
- use lug bolts or equal to bolt down unit, reducing vibration and noise.
- install in a location where no antenna of a television or radio exists within 10' (3 m).

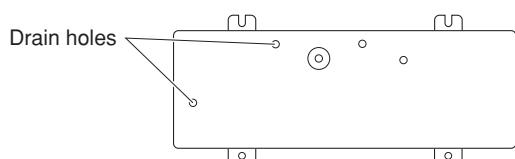


Fig. 5a

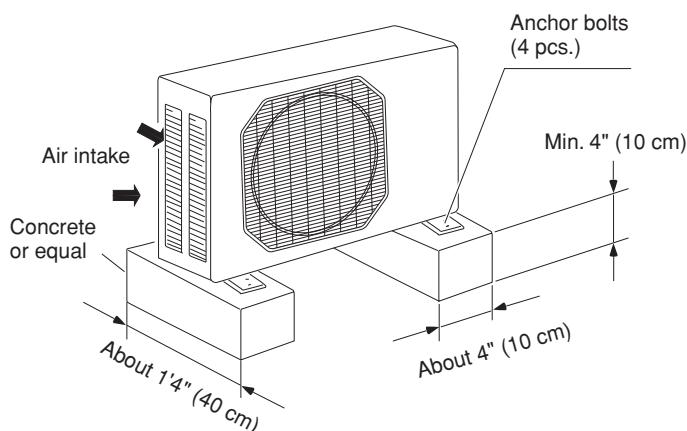


Fig. 5b

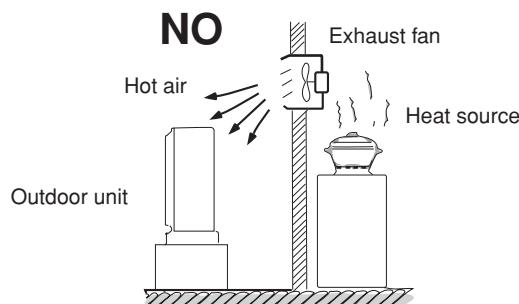


Fig. 3

(CU-KE12NK1)

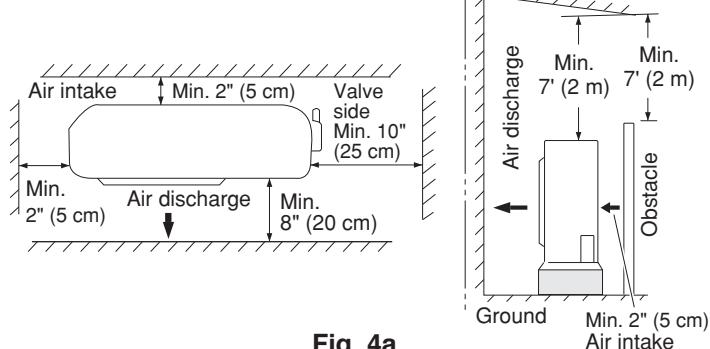


Fig. 4a

(CU-KE18NKU)

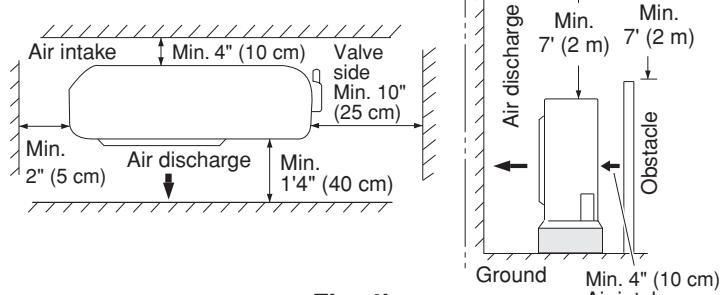


Fig. 4b

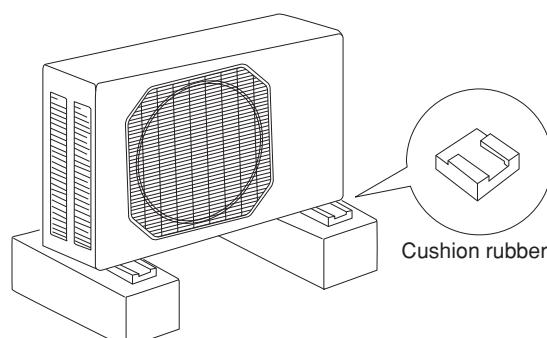


Fig. 5c

3. How to Install the Indoor Unit

3-1. Preparation for Suspending

This unit uses a drain pump. Use a carpenter's level to check that the unit is level.

3-2. Suspending the Indoor Unit

- (1) Fix the suspension bolts securely in the ceiling using the method shown in the diagrams, by attaching them to the ceiling support structure, or by any other method that ensures that the unit will be securely and safely suspended. (Fig. 6-1)
- (2) Follow the diagram to make the holes in the ceiling.
- (3) Determine the pitch of the suspension bolts using the supplied full-scale installation diagram. The diagram shows the relationship between the positions of the suspension fitting, unit, and panel. (Fig. 6-2)

3-3. Placing the Unit Inside the Ceiling

- (1) Be sure to remove the fan protection (4pcs) for transportation before hanging up the indoor unit.
- (2) When placing the unit inside the ceiling, determine the pitch of the suspension bolts using the supplied full-scale installation diagram. (Fig. 6-3)
Tubing and wiring must be laid inside the ceiling when suspending the unit. If the ceiling is already constructed, lay the tubing and wiring into position for connection to the unit before placing the unit inside the ceiling.
- (3) The length of suspension bolts must be appropriate for a distance between the bottom of the bolt and the bottom of the unit of more than $19/32"$ (15 mm) as shown in the diagram. (Fig. 6-4)
- (4) Thread the 3 hexagonal nuts (locally purchased) and 2 supplied washers onto each of the 4 suspension bolts as shown in the diagram. Use 1 nut and 1 washer for the upper side, and 2 nuts and 1 washer for the lower side, so that the unit will not fall off the suspension lug. (Fig. 6-4)
- (5) Adjust so that the distance between the unit and the ceiling bottom is $1/2"$ (13 mm) to $23/32"$ (18 mm). Tighten the nuts on the upper side and lower side of the suspension lug. (Fig. 6-4)

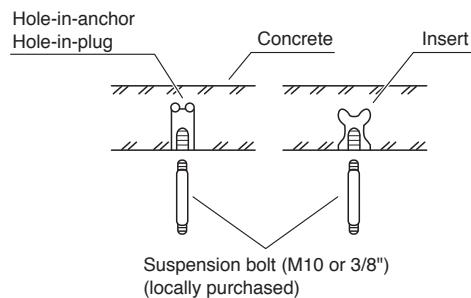


Fig. 6-1

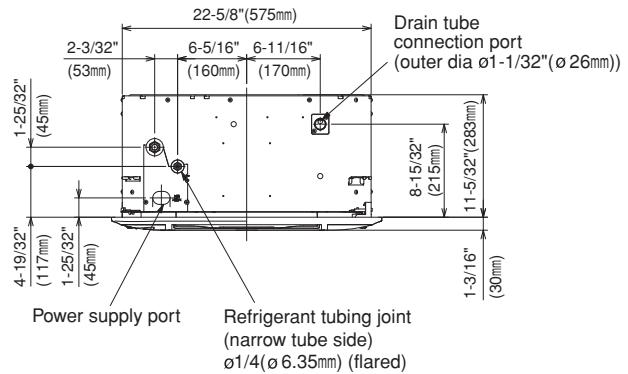
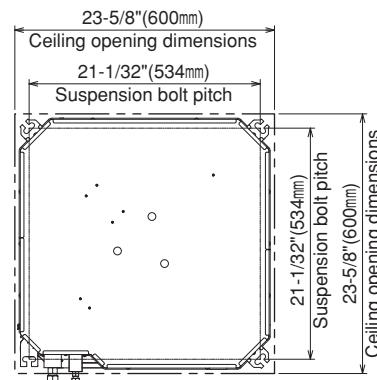


Fig. 6-2

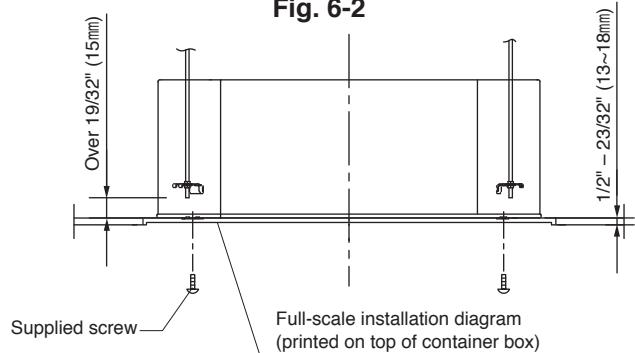


Fig. 6-3

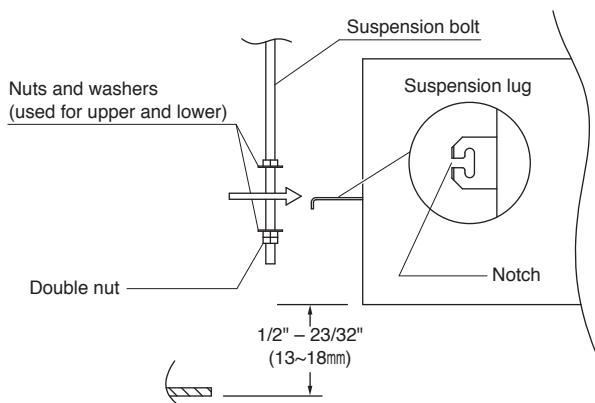


Fig. 6-4

3-4. Installing the Drain Piping

- (1) Prepare standard hard PVC pipe (locally purchased O.D. 1-1/32" (26 mm)) for the drain and use the supplied hose band to prevent water leaks. (Fig. 6-5)
- (2) To install the drain hose, first place 1 of the 2 hose bands over the unit drain port and the other hose band over the hard PVC pipe (not supplied). Then connect both ends of the supplied drain hose. (Fig. 6-5)
- (3) On the unit drain side, grasp the hose band with pliers and insert the drain hose all the way to the base.
- If other commercially available hose bands are used, the drain hose may become pinched or wrinkled and there is danger of water leakage. Therefore be sure to use the supplied hose bands. When sliding the hose bands, be careful to avoid scratching the drain hose.
- Do not use adhesive when connecting the supplied drain hose to the drain port (either on the main unit or the PVC pipe).

Reasons: a) It may cause water to leak from the connection. Since the connection is slippery just after the adhesive has been applied, the pipe easily slips off.
b) The pipe cannot be removed when maintenance is needed.

- (4) Wrap the hose with the supplied drain hose insulation and use the 4 twist ties so that the hose is insulated with no gaps.
- Do not bend the supplied drain hose 90° or more. The hose may slip off.

NOTE

Make sure the drain pipe has a downward gradient (1/100 or more) and that there are no water traps.



CAUTION

- In cases where it is necessary to raise the height of the drain piping, the drain piping can be raised to a maximum height of 2.78 ft. (850 mm) above the bottom surface of the ceiling. Under no conditions attempt to raise it higher than 2.78 ft. (850 mm) above the bottom surface of the ceiling. Doing so will result in water leakage. (Fig. 6-7)
- Do not use natural drainage.
- Do not install the pipe with an upward gradient from the connection port. This will cause the drain water to flow backward and leak when the unit is not operating. (Fig. 6-8)
- Do not apply force to the piping on the unit side when connecting the drain pipe. The pipe should not be allowed to hang unsupported from its connection to the unit. Fasten the pipe to a wall, frame, or other support as close to the unit as possible. (Fig. 6-9)
- Provide insulation for any pipes that are run indoors.

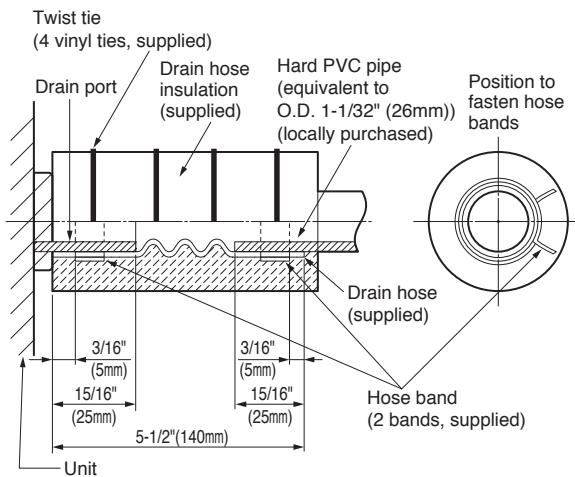


Fig. 6-5



CAUTION

- Attach so that the hose band fastener is on the side of the drain port.
- Attach the hose bands so that each is approximately 3/16" (5 mm) to 15/16" (25 mm) from the end of the supplied drain hose.

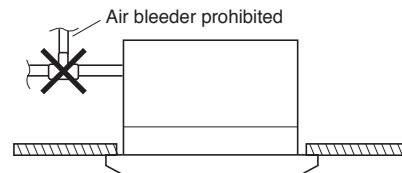


Fig. 6-6



CAUTION

- Do not install an air bleeder as this may cause water to spray from the drain pipe outlet. (Fig. 6-6)

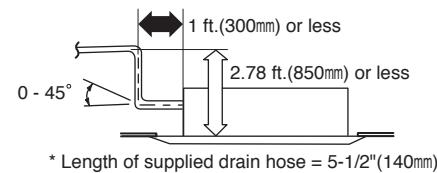


Fig. 6-7

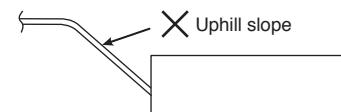


Fig. 6-8

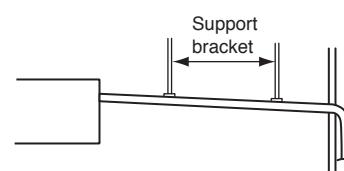


Fig. 6-9

3-5. Checking the Drainage

After wiring and drain piping are completed, use the following procedure to check that the water will drain smoothly. For this, prepare a bucket and wiping cloth to catch and wipe up spilled water.

- Be sure to do the wiring between the units before installing the ceiling panel. (Refer to 3-9. Wiring Instructions for Inter-unit Connections)

- (1) Turn on the power. (Here, "power" refers to the power supply from the outdoor unit.)
- (2) Slowly pour approx. 16 ounces (500 ml) of water into the drain pan to check drainage. (Fig. 6-10a)
- (3) Remove the 2 screws from the control box cover, then open the cover. Be careful not to drop the cover at this time.
- (4) Disconnect the FS 3P connector (red) on the control PCB and operate the drain pump. (Fig. 6-10b) Check the water flow through the transparent drain pipe and see if there is any leakage.
- (5) When the check of drainage is complete, reconnect the FS 3P connector and remount the control cover.



CAUTION

The drain pump will continue to operate for a minimum of 6 minutes after the FS 3P connector is reconnected.

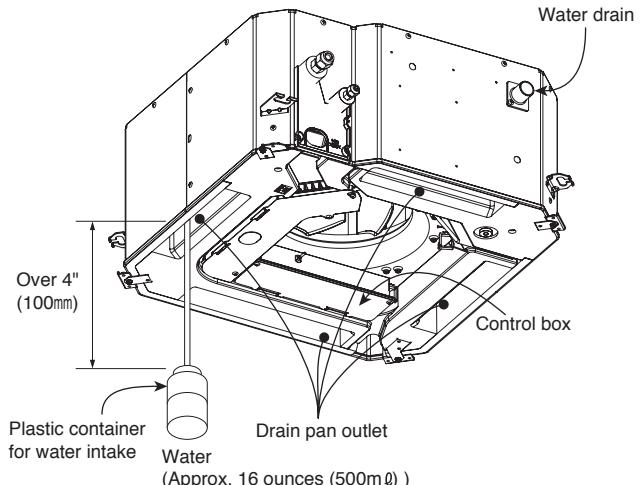


Fig. 6-10a

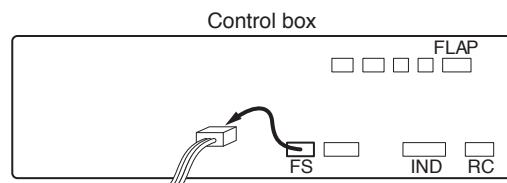


Fig. 6-10b

Ⓐ must be within the range of 1/2"(13mm) to 23/32"(18mm). (Fig. 6-11) If not within this range, malfunction or other trouble may occur.

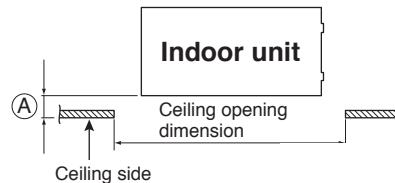


Fig. 6-11

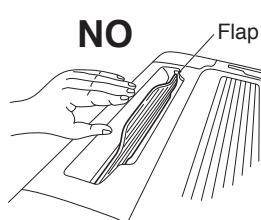


Fig. 6-12

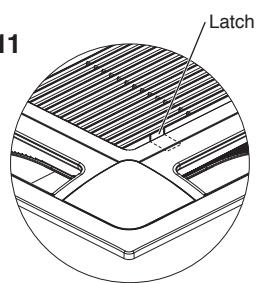


Fig. 6-13

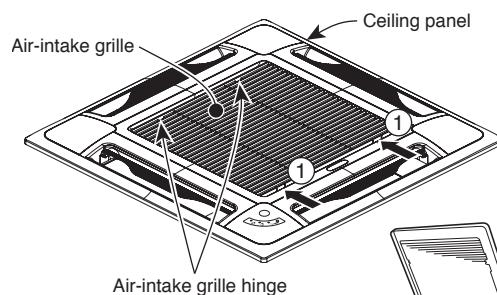


Fig. 6-14

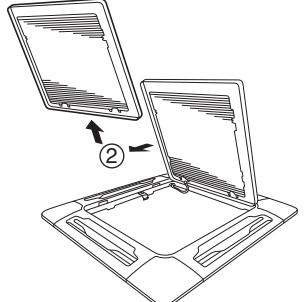


Fig. 6-15

3-6. How to Install the Ceiling Panel

Checking the unit position

- (1) Check that the ceiling hole is 23-5/8" (600 mm) × 23-5/8" (600 mm) (Fig. 6-11)
- (2) Confirm that the position of the indoor unit and the ceiling as shown in the diagram. If the positions of the ceiling surface and unit do not match, air leakage, water leakage, flap operation failure, or other problems may occur. (Fig. 6-11)



CAUTION

- Never place the panel face-down. Neither hang it vertically nor place it on top of a projecting object. Placing it face-down will damage the surface.
- Do not touch the flap or apply force to it. (This may cause flap malfunction.) (Fig. 6-12)

3-6-1. Before Installing the Ceiling Panel

- (1) Remove the air-intake grille and air filter from the ceiling panel.
 - a) Press on and slide the two latches of the air-intake grille with your thumb in the direction shown by the arrow ① to open the grille. (Figs. 6-13 and 6-14)
 - b) With the air-intake grille opened, remove the grille hinge from the ceiling panel by sliding it in the direction shown by the arrow ②. (Fig. 6-15)

(2) Removing the corner cover and indicator cover

a) While lightly pressing the center of the corner cover, pull up the tab for the screw hole. Use the same procedure to remove the indicator cover. (Fig. 6-16)

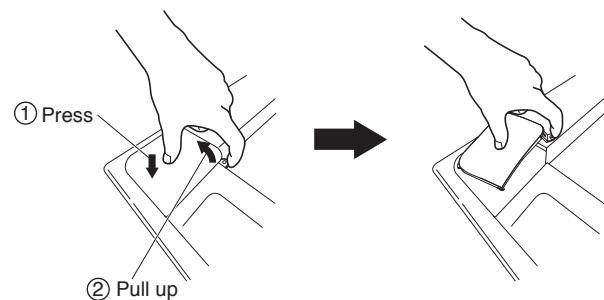
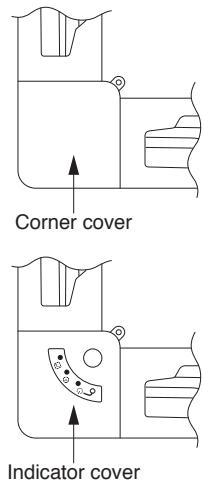


Fig. 6-16

3-6-2. Installing the Ceiling Panel

(1) Hang the temporary latches on the inside of the ceiling panel to the receptacle on the unit to temporarily attach the ceiling panel in place. (Fig. 6-17)

- The ceiling panel must be installed in the correct direction relative to the unit. Align the REF. PIPE and DRAIN marks on the ceiling panel corner with the correct positions on the unit.

(2) Align the panel installation holes and the unit screw holes. (Fig. 6-18)

(3) Tighten the supplied special screws at the 4 panel installation locations so that the panel is attached tightly to the unit.

- Check that the wiring connectors are not caught between the unit and the ceiling panel.

(4) Check that the panel is attached tightly to the ceiling. (Fig. 6-19)

- At this time, make sure that there are no gaps between the unit and the ceiling panel, or between the ceiling panel and the ceiling surface.

- If there is a gap between the panel and the ceiling, leave the ceiling panel attached and make fine adjustments to the installation height of the unit to eliminate the gap with the ceiling.

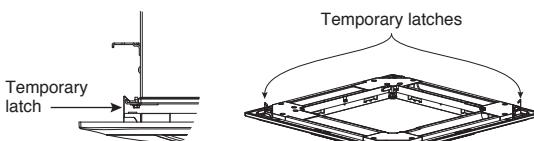


Fig. 6-17

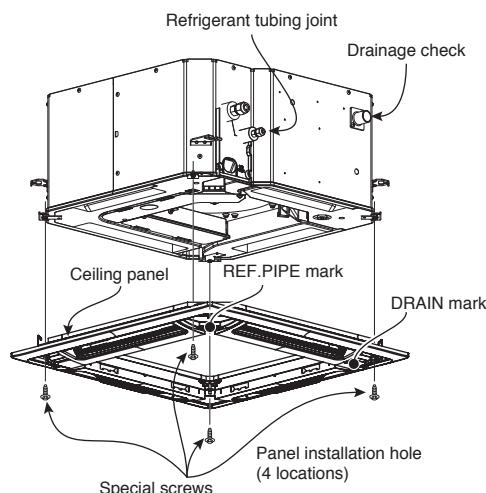


Fig. 6-18

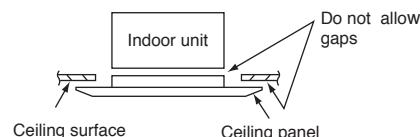


Fig. 6-19



- If the screws are not sufficiently tightened, trouble such as that shown in the figure below may occur. Be sure to tighten the screws securely.

- If a gap remains between the ceiling surface and the ceiling panel even after the screws are tightened, adjust the height of the unit again.

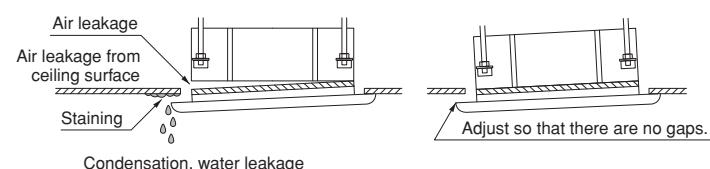
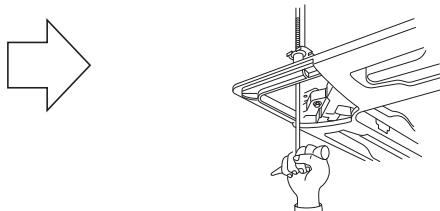


Fig. 6-20

The height of the unit can be adjusted from the ceiling panel corner hole, with the ceiling panel attached, to an extent that does not affect the unit levelness, the drain hose, or other elements.



3-6-3. Wiring the Ceiling Panel and the Indicator

- (1) Remove the 2 screws from the control box cover, then open the cover. Be careful that the cover does not fall.
- (2) Connect the 5P FLAP wiring connector from the ceiling panel to the connector on the control PCB in the control box. (Fig. 6-21)
- (3) Connect the 7P IND and 4P RC wiring connector from the indicator to the connectors on the control PCB in the control box. (Fig. 6-21)
- (4) Be sure to use the clamps to fasten the connector wires in place. (Fig. 6-21)
- (5) Tighten the 2 cover screws to close the cover.

- Check that the wiring connectors are not caught between the electrical component box and the cover.
- If the indicator connector is not securely connected, the remote controller signal will not be received.
- If the connectors are not connected, the auto flap will not operate. Be sure to connect them securely.

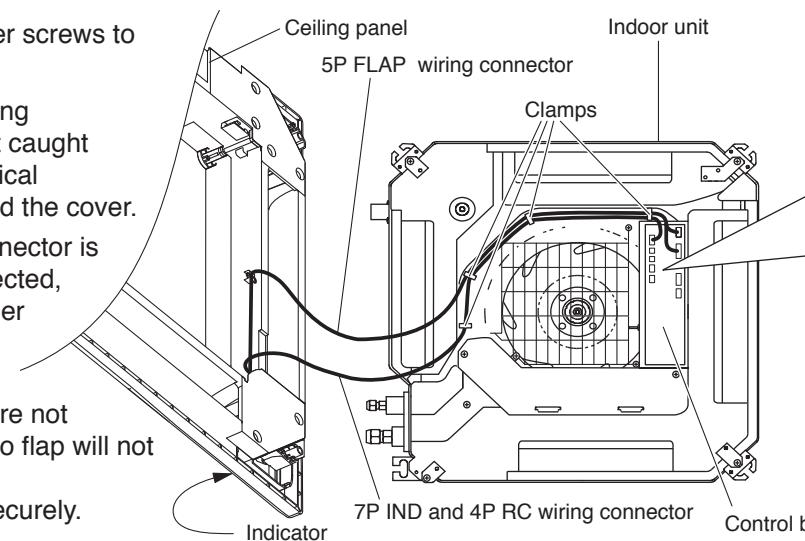
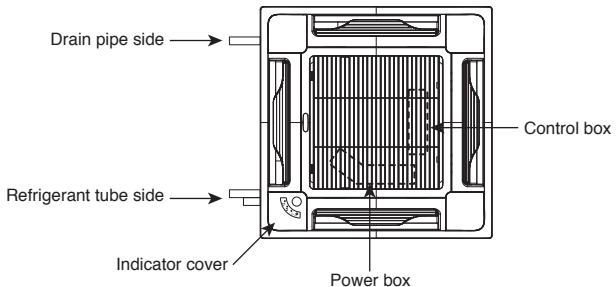
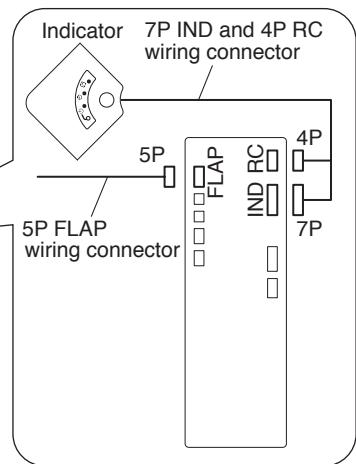


Fig. 6-22



As to how to attach the indicator cover, refer to Fig. 6-23.

Fig. 6-22



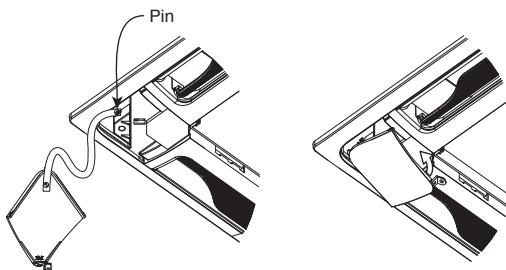
* Pass the wiring connectors through the clamps to fasten them in place, as shown in the figure.

Fig. 6-21

3-6-4. How to Attach the Corner Cover and Air-Intake Grille

A. Attaching the corner cover

- (1) Check that the safety strap from the corner cover is fastened to the ceiling panel pin, as shown in the figure. (Fig. 6-23)
- (2) Use the supplied screws to attach the corner cover to the ceiling panel.



Place the corner cover so that the 3 tabs fit into the holes in the ceiling panel. Then fasten it in place with the supplied screws.

Fig. 6-23

B. Attaching the air-intake grille

- To install the air-intake grille, follow the steps for 3-6-1. **Before Installing the Ceiling Panel** in the reverse order.

By rotating the air-intake grille, it is possible to attach the grille onto the ceiling panel from any of 4 directions. (Fig. 6-25)

- When attaching the air-intake grille, be careful that the flap and the indicator wiring do not become caught.
- Be sure to attach the safety cord that prevents the air-intake grille from dropping off to the ceiling panel unit as shown in Fig. 6-24.

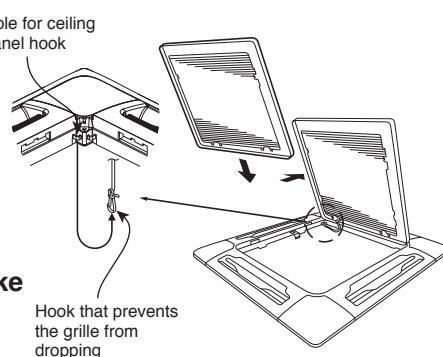


Fig. 6-24

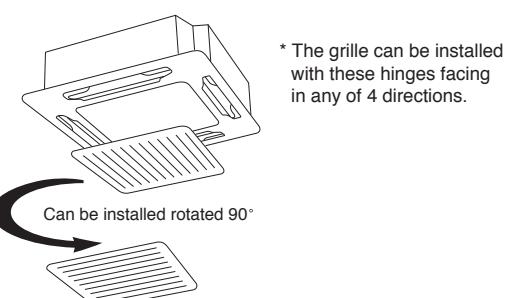


Fig. 6-25

3-6-5. Checking After Installation

- Check that there are no gaps between the unit and the ceiling panel, or between the ceiling panel and the ceiling surface. Gaps may cause water leakage and condensation.
- Check that the wiring is securely connected.
If it is not securely connected, the auto flap will not operate. In addition, water leakage and condensation may occur.

3-6-6. When Removing the Ceiling Panel for Servicing

When removing the ceiling panel for servicing, remove the air-intake grille and air filter, disconnect the flap and the indicator wiring connectors inside the control box, and then remove the 4 mounting screws.

3-6-7. Adjusting the Auto Flap

The air-direction flap on the ceiling panel outlet can be adjusted as follows.

- Adjust the flap to the desired angle using the remote controller. The flap also has an automatic air-sweeping mechanism.

NOTE

- Never attempt to move the flap by hand.
- Proper air flow depends on the location of the air conditioner, the layout of the room and furniture, etc. If cooling or heating seems inadequate, try changing the direction of the air flow.

3-7. Wiring Instructions

General precautions on wiring

- (1) Before wiring, confirm the rated voltage of the unit as shown on its nameplate, then carry out the wiring closely following the wiring diagram.
- (2) Provide a power outlet to be used exclusively for each unit, with a power supply disconnect and circuit breaker for overcurrent protection provided in the exclusive line.
- (3) To prevent possible hazards due to insulation failure, the unit must be grounded.
- (4) Each wiring connection must be done tightly and in accordance with the wiring system diagram. Wrong wiring may cause the unit to misoperate or become damaged.
- (5) Do not allow wiring to touch the refrigerant tubing, compressor, or any moving parts of the fan.
- (6) Unauthorized changes in the internal wiring can be very dangerous. The manufacturer will accept no responsibility for any damage or misoperation that occurs as a result of such unauthorized changes.

3-8. Recommended Wire Length and Diameter

Regulations on wiring diameter differ from locality to locality. For field wiring requirements, please refer to your local electrical codes. Carefully observe these regulations when carrying out the installation.

Table 4 lists recommended wire lengths and diameters for power supply systems.

NOTE

Refer to the wiring system diagram (Fig. 7a or Fig. 7b) for the meaning of (A), (B) and (C) in Table 4.

Refer to your local codes or in the absence of local codes see the National Electric Code: ANSI/NFPA70.

Table 4

Cross-Sectional Area (AWG) Model	(A)+(B)	(A) Power Supply Wiring Length (ft) (B) Power Line Length (ft)	(C) Control Line Length (ft)	Fuse or Circuit Breaker Capacity
	(#14)	(#12)	(#14)	
CU-KE12NK1	131 (Max.)	230 (Max.)	65 (Max.)	20A
CU-KE18NKU	131 (Max.)	230 (Max.)	100 (Max.)	15A

... AWG (American Wire Gauge)



WARNING

- Be sure to comply with local codes on running the wire from the indoor unit to the outdoor unit (size of wire and wiring method, etc.).
- Each wire must be firmly connected.
- No wire should be allowed to touch refrigerant tubing, the compressor, or any moving part.



WARNING

- To avoid the risk of electric shock, each air conditioner unit must be grounded.
- For the installation of a grounding device, please observe local electrical codes.
- Grounding is necessary, especially for units using inverter circuits, in order to release charged electricity and electrical noise caused by high tension. Otherwise, electrical shock may occur.
- Place a dedicated ground more than 7' (2 m) away from other grounds and do not have it shared with other electric appliances.



CAUTION

- Be sure to connect the power supply line to the outdoor unit as shown in the wiring diagram. The indoor unit draws its power from the outdoor unit.
- Do not run wiring for antenna, signal, or power lines of television, radio, stereo, telephone, security system, or intercom any closer than 3'3" (1 m) from the power cable and wires between the indoor and outdoor units. Electrical noise may affect the operation.

WIRING SYSTEM DIAGRAM

(CU-KE12NK1)

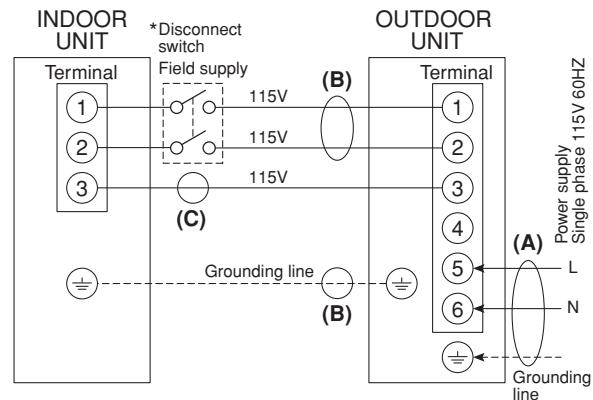


Fig. 7a

(CU-KE18NKU)

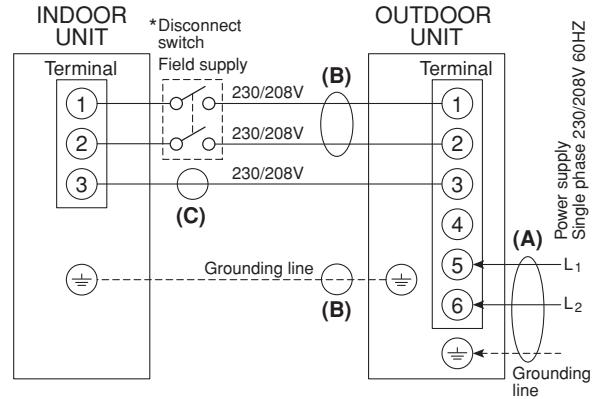


Fig. 7b

***** **NOTE**

A disconnect switch may be required by national or local codes.



CAUTION

Always comply with national and local code requirements.

3-9. Wiring Instructions for Inter-unit Connections

- (1) Remove the 1 screw from the terminal cover, then open the cover. Be careful that the cover does not fall.
- (2) Remove the 3 screws from the power box cover, then open the cover. Be careful that the cover does not fall.
- (3) Use the screw to securely fasten the ground wire from the outdoor unit in place.
- (4) Remove the transparent plastic cover from the 3P terminal plate.
- (5) While viewing the wiring diagram, connect the inter-unit and power supply line to terminals 1, 2 and 3 on the 3P terminal plate.
- (6) Remount the transparent plastic cover onto the 3P terminal plate.
- (7) Be sure to use the clamping strap to fasten the wires in place.
- (8) Tighten the screws to remount the terminal and the power box cover.



WARNING

Loose wiring may cause the terminal to overheat or result in unit malfunction. A fire hazard may also exist. Therefore, be sure all wiring is tightly connected.

When connecting each power wire to the corresponding terminal, follow the instructions "How to connect wiring to the terminal" and fasten the wire securely tight with the fixing screw of the terminal plate.

How to connect wiring to the terminal

a) For Indoor Unit

- (1) Cut the wire end with a cutting pliers, then strip the insulation to expose the wire about $9/32"$ (7 mm). See the label (Fig. 9) near the terminal plate.
- (2) Using a screwdriver, loosen the terminal screw on the terminal plate.
- (3) Insert the wire and tighten the terminal screw completely using a screwdriver.

b) For Outdoor Unit

■ For solid core wiring (or F-cable)

- (1) Cut the wire end with a cutting pliers, then strip the insulation to expose the solid wire about $15/16"$ (25 mm). (Fig. 10)
- (2) Using a screwdriver, remove the terminal screw(s) on the terminal plate.
- (3) Using the pliers, bend the solid wire to form a loop suitable for the terminal screw.
- (4) Shape the loop wire properly, place it on the terminal plate and fix it securely with the removed terminal screw using a screwdriver.

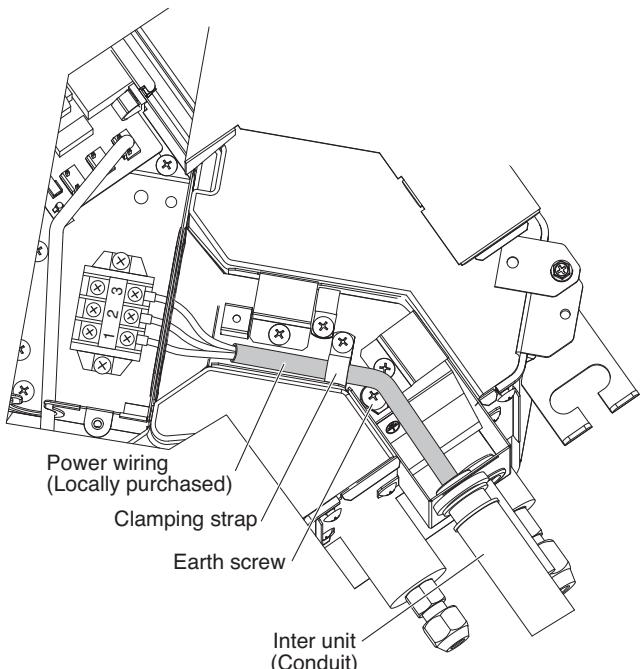


Fig. 8

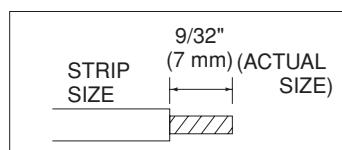


Fig. 9

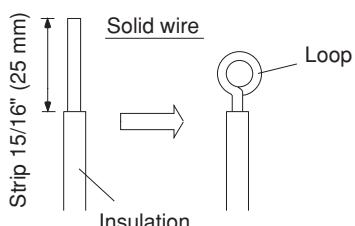


Fig. 10

■ For stranded wiring

- (1) Cut the wire end with a cutting pliers, then strip the insulation to expose the stranded wiring about 3/8" (10 mm) and tightly twist the wire ends. (Figs. 11 and 12)
- (2) Using a screwdriver, remove the terminal screw(s) on the terminal plate.
- (3) Using a ring connector fastener or pliers, securely clamp each stripped wire end with a ring connector. (Fig. 11)
- (4) Place the ring connector wire, and replace and tighten the removed terminal screw using a screwdriver. (Fig. 13)

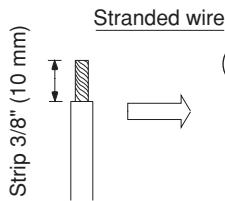


Fig. 11

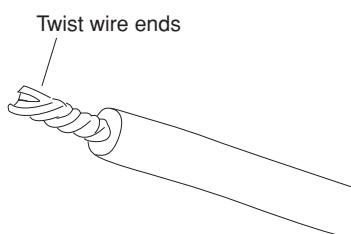


Fig. 12

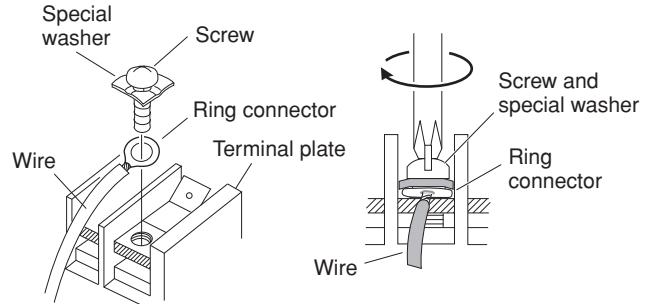


Fig. 13

4. How to Install the Outdoor Unit

First refer to Section 2. Installation Site Selection.

4-1. Wiring Instructions for the Outdoor Unit

Regulations on wire size differ from locality to locality. For field wiring requirements, please refer to your local electrical codes. Make sure that the installation fully complies with all local and national regulations.

- (1) Remove access panel "C". (Fig. 14)
- (2) Connect the inter-unit and power supply line according to the drawing on the panel side.
- (3) Be sure to size each wire allowing approx. 4" (10 cm) longer than the required length for wiring. Store excess wiring inside the cabinet.
- (4) When connections are completed, check that all connections are correct as shown in the wiring system diagram on panel side.
- (5) Be sure to ground the unit according to your local codes.

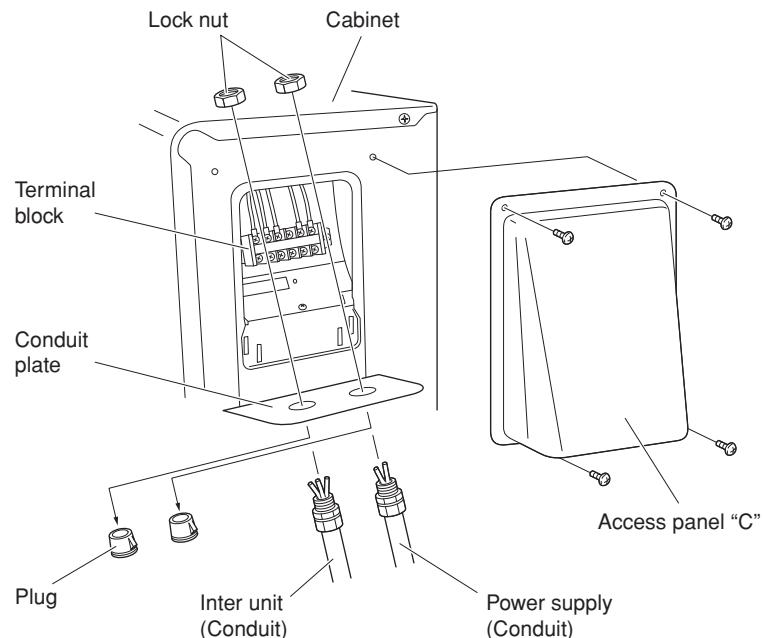


Fig. 14

5. Refrigerant Tubing

5-1. Use of the Flaring Method

Many of the conventional split system air conditioners employ the flaring method to connect refrigerant tubes which run between indoor and outdoor units. In this method, the copper tubes are flared at each end and connected with flare nuts.

5-2. Flaring Procedure with a Flare Tool

- (1) Cut the copper tube to the required length with a tube cutter. It is recommended to cut approx. 12" to 20" (30 to 50 cm) longer than the tubing length you estimate.
- (2) Remove burrs at the end of the copper tube with a tube reamer or file. This process is important and should be done carefully to make a good flare. (Fig. 15)

NOTE

When reaming, hold the tube end downward and be sure that no copper scraps fall into the tube. (Fig. 16)

- (3) Remove the flare nut from the unit and be sure to mount it on the copper tube.
- (4) Make a flare at the end of copper tube with a flare tool.* (Figs. 17 and 18)

(*Use "RIDGID" or equivalent.)

NOTE

A good flare should have the following characteristics:

- inside surface is glossy and smooth.
- edge is smooth.
- tapered sides are of uniform length.

5-3. Caution before Connecting Tubes Tightly

- a) Be sure to apply a sealing cap or water-proof tape to prevent dust or water from getting into the tubes before they are used.
- b) Be sure to apply refrigerant lubricant to the matching surfaces of the flare and union before connecting them together. This is effective for reducing gas leaks. (Fig. 19)
- c) For proper connection, align the union tube and flare tube straight with each other, then screw in the flare nut lightly at first to obtain a smooth match. (Fig. 20)

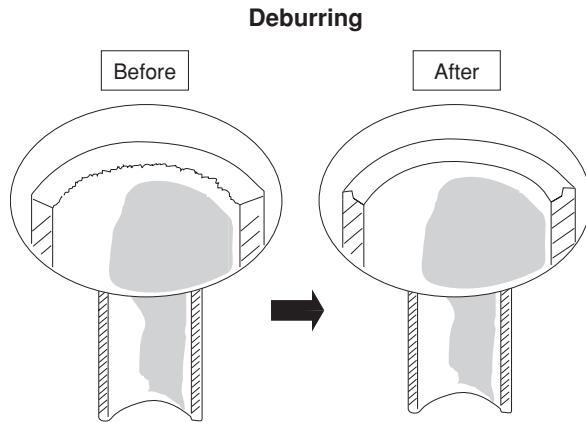


Fig. 15

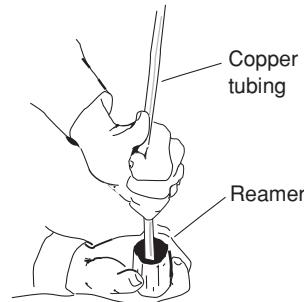
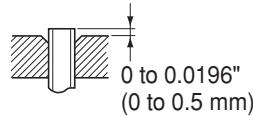
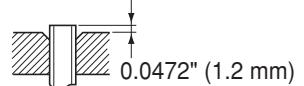


Fig. 16

If the special R410A flare tool is used:



If the previous flare tool (clutch-type) is used:



Adjust so that the amount of tube protrusion is as shown in the figure.

Fig. 17

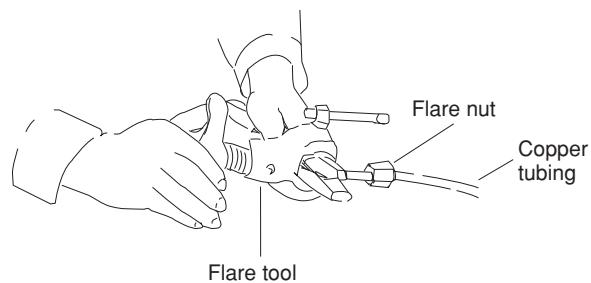


Fig. 18

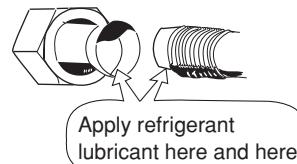


Fig. 19

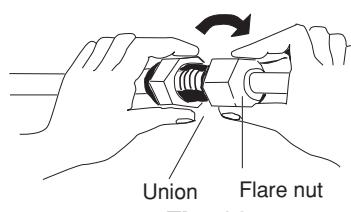


Fig. 20

5-4. Connecting Tubing between Indoor and Outdoor Units

- Tightly connect the indoor side refrigerant tubing extended from the wall with the outdoor side tubing. (Fig. 21)
- To fasten the flare nuts, apply specified torque as:

Table 5

Tube Dia.	Nut	Tightening Torque
1/4" (6.35 mm)	21/32" (17 mm)	Approx. 120 – 160 lbs·in (140 – 180 kgf·cm)
3/8" (9.52 mm)	7/8" (22 mm)	Approx. 300 – 360 lbs·in (340 – 420 kgf·cm)
1/2" (12.70 mm)	1-1/32" (26 mm)	Approx. 430 – 480 lbs·in (490 – 550 kgf·cm)
5/8" (15.88 mm)	1-5/32" (29 mm)	Approx. 590 – 710 lbs·in (680 – 820 kgf·cm)

5-5. Insulation of Refrigerant Tubing

IMPORTANT

To prevent heat loss and wet floors due to dripping of condensation, **both tubes must be well insulated with a proper insulation material**.

The thickness of the insulation should be a minimum 5/16" (8 mm). (Fig. 22)

Taping the flare nuts

Wind the insulation tape around the flare nuts at the tube connections. Secondly cover up the tubing connections with the flare insulation (1/8" (T3, supplied)). Then wind the other flare insulation (3/16" (T5, supplied)). Finally, fasten the insulation at both ends with the supplied vinyl ties. (Fig. 23)

Insulation material

The material used for insulation must have good insulation characteristics, be easy to use, be age resistant, and must not easily absorb moisture.



CAUTION

After a tube has been insulated, never try to bend it into a narrow curve because it can cause the tube to break or crack.

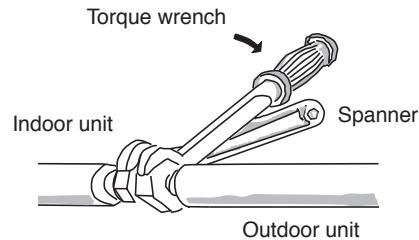


Fig. 21

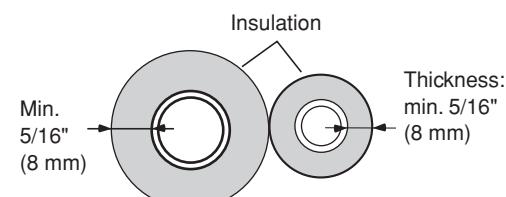


Fig. 22

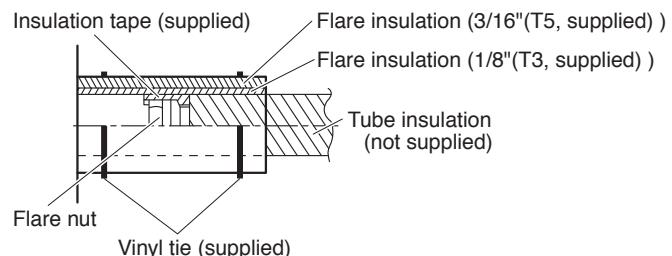


Fig. 23

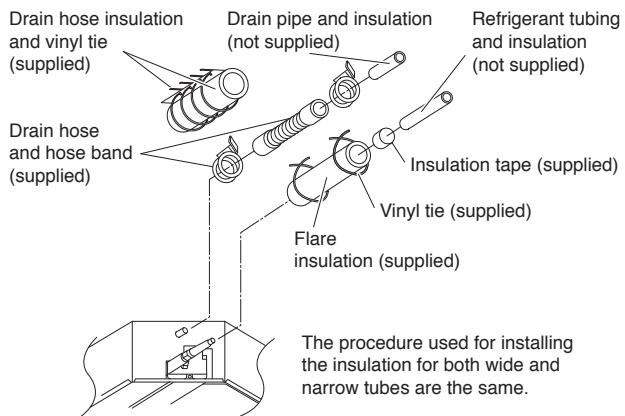


Fig. 24

Never grasp the drain or refrigerant connecting outlets when moving the unit.

5-6. Taping the Tubes

- (1) At this time, the 2 refrigerant tubes (and electrical wire if local codes permit) should be taped together with armoring tape. The drain hose may also be included and taped together as 1 bundle with the tubing.
- (2) Wrap the armoring tape from the bottom of the outdoor unit to the top of the tubing where it enters the wall. As you wrap the tubing, overlap half of each previous tape turn. (Fig. 25)
- (3) Clamp the tubing bundle to wall, using 1 clamp approx. every 47" (120 cm).

NOTE

Do not wind the armoring tape too tightly, since this will decrease the heat insulation effect. Also, be sure the condensation drain hose splits away from the bundle and drips clear of the unit and the tubing.

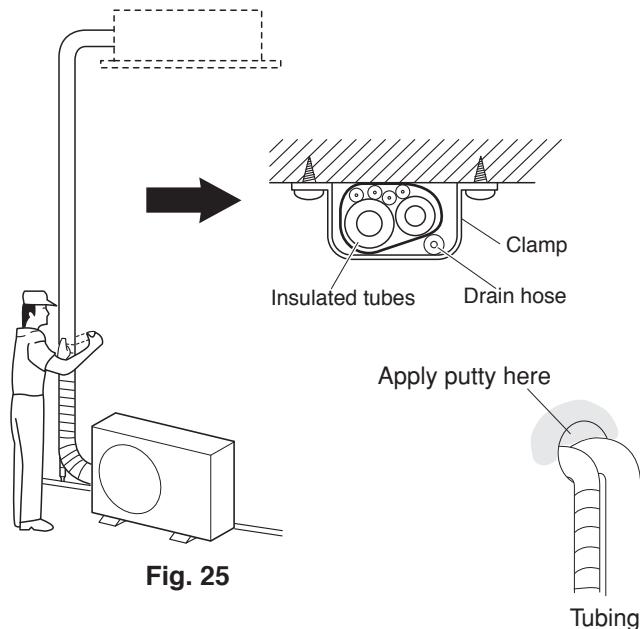


Fig. 25

5-7. Finishing the Installation

After finishing insulating and taping over the tubing, use sealing putty to seal off the hole in the wall to prevent rain and draft from entering. (Fig. 26)

6. Air Purging

Air and moisture remaining in the refrigerant system have undesirable effects as indicated below. Therefore, they must be purged completely.

- pressure in the system rises
- operating current rises
- cooling (or heating) efficiency drops
- moisture in the air may freeze and block capillary tubing
- water may lead to corrosion of parts in the refrigerant system

■ Air Purging with a Vacuum Pump (for Test Run)

- (1) Check that each tube (both narrow and wide tubes) between the indoor and outdoor units have been properly connected and all wiring for the test run has been completed. Note that both narrow and wide tube service valves on the outdoor unit are kept closed at this stage.
- (2) Using an adjustable wrench or box wrench, remove the valve caps from the service valve on both narrow and wide tubes.
- (3) Connect a vacuum pump and a manifold valve (with pressure gauges) to the service port on the wide tube service valve. (Fig. 27)



CAUTION

The service port on the wide tube service valve uses a Schrader core valve to access the refrigerant system. The valve core is similar to those used in automobile tires. Therefore, be sure to use a vacuum hose connector which has a push-pin inside.



CAUTION

Be sure to use a manifold valve for air purging. If it is not available, use a stop valve (field supply) for this purpose. The "Hi" knob of the manifold valve must always be kept closed.

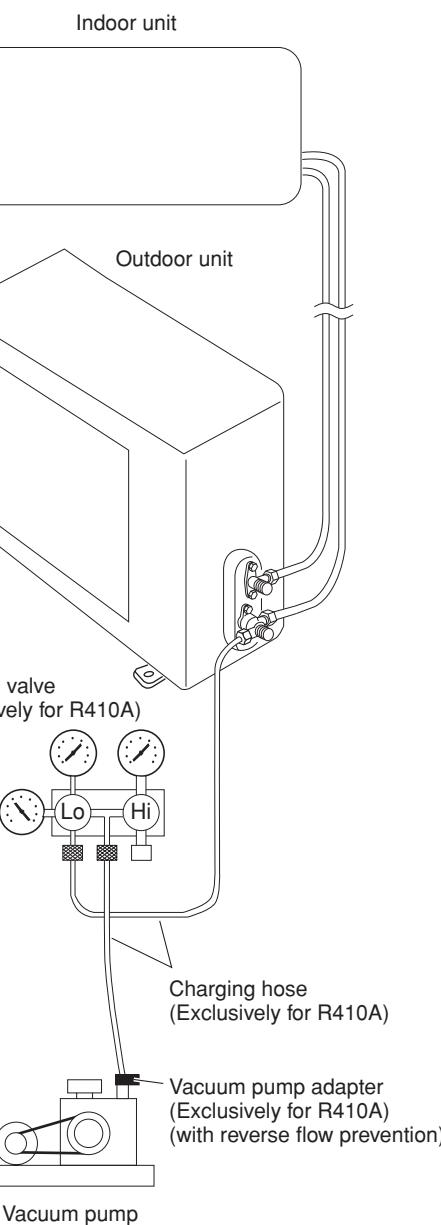


Fig. 26

(4) With the "Lo" knob of the manifold valve open, run the vacuum pump. The operation time for the vacuum pump varies with tubing length and the capacity of the pump. The following table shows the amount of time for evacuation:

Table 6

Required time for evacuation when 26.4 gal/h (100 liter/h) vacuum pump is used	
If tubing length is less than 33 ft. (10 m)	If tubing length is more than 33 ft. (10 m)
10 min. or more	15 min. or more

(5) With the vacuum pump still running, close the "Lo" knob of the manifold valve. Then stop the vacuum pump.

(6) With the hex wrench, turn the valve stem on the narrow tube service valve counter-clockwise by 90 degrees (1/4 turn) for 10 seconds, and then turn the stem clockwise to close it again. (Fig. 28)



CAUTION

Be sure to completely insert the hex wrench before attempting to turn the valve.

(7) Leak test all joints at the tubing (both indoor and outdoors) with soapy water. Bubbles indicate a leak. Tighten the joint more when leaks, then check if there is no leak. Be sure to wipe off the soap with a clean cloth.

(8) With the hex wrench, turn the wide tube service valve stem counter-clockwise to fully open the valve.

(9) Turn the narrow tube service valve stem counter-clockwise to fully open the valve.

(10) Loosen the vacuum hose connected to the wide tube service port slightly to release the pressure. Then, remove the hose.



CAUTION

This may cause the refrigerant gas to leak. In order to avoid this, take off the hose quickly.

(11) Fasten the valve cap on the wide tube service port securely with an adjustable wrench or box wrench. Next, mount the valve cap on the service valve and tighten it to 170 lbs·in (200 kgf·cm) with a torque wrench. This process is very important to prevent gas from leaking from the system.

(12) Test run the air conditioner. (See next page.)

(13) While the air conditioner is running, apply liquid soap to check for any gas leaks around the service valves or caps.

(14) If there is no leakage, stop the air conditioner.

(15) Wipe off the soap on the tubing.

This completes air purging with a vacuum pump and the air conditioner is ready for actual operation.

NOTE

To prevent other refrigerants from being mistakenly charged to units which use R410A, the size of the charge port on the service valve is different from the one for other refrigerant types. For servicing such as recharging, the specified charging hose, manifold and vacuum pump adapter (with reverse flow prevention) for R410A must be used.

NOTE

The required time in Table 6 is calculated based on the assumption that the ideal (or target) vacuum condition is around 0.193 psi (10 mmHg abs.).

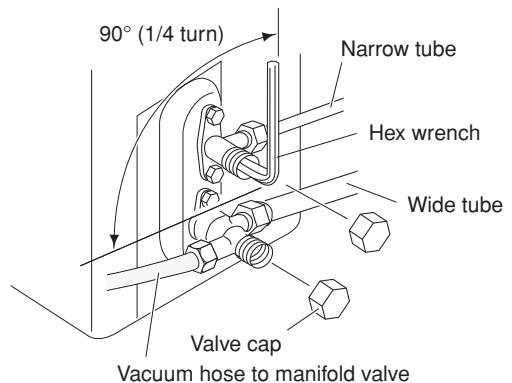


Fig. 28

How to Test Run the Air Conditioner

After turning on the power of the air conditioner, use the remote controller and follow the steps below to conduct the test run.

- (1) Set the remote controller in Test Run mode. (Fig. 29)
 - a) Press and hold the HIGH POWER button and the 1HR. TIMER button.
 - b) Then press and hold the ACL (Reset) button with a pointed object such as the tip of a pen. After 5 seconds, release the ACL button first.
 - c) Then release the HIGH POWER and 1HR. TIMER buttons.
 - d) \ast appears and “oP-1” blinking in the remote controller clock display area. (Fig. 30)
- (2) Start Cooling mode test run by pressing the ON/OFF operation button of the remote controller. (Fig. 29)
 - This starts the fan producing uncooled forced air with the 3 indicator lamps (OPERATION lamp, TIMER lamp, and HIGH POWER lamp) on the main unit blinking. (Fig. 31)
 - After 3 minutes, the system shifts into cooling operation, and cool air will start to be felt. Cooling mode test run is unaffected by the room temperature.
- (3) Press the ON/OFF operation button of the remote controller again to stop the test run. (Fig. 29)
- (4) Finally press the ACL (Reset) button of the remote controller to release it from Test Run mode to return to normal mode. (Fig. 29)
 - “ \ast ” and “oP-1” will disappear from the remote controller clock display area.

NOTE

Troubleshooting:

In the event that the green OPERATION lamp is blinking upon powering up the system, an error condition exists. In this case, refer to the self-diagnostics procedure which can be seen by opening the air-intake grille.

IMPORTANT

After the test run is completed, be sure to press the ACL (Reset) button to return to normal mode. The air conditioner will not operate correctly if this is not done.

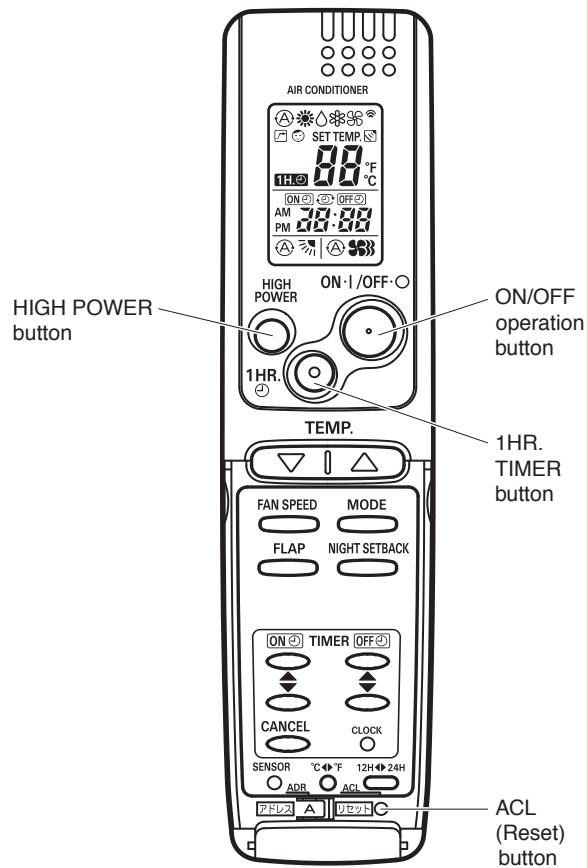


Fig. 29

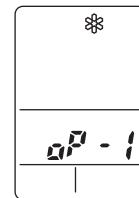


Fig. 30

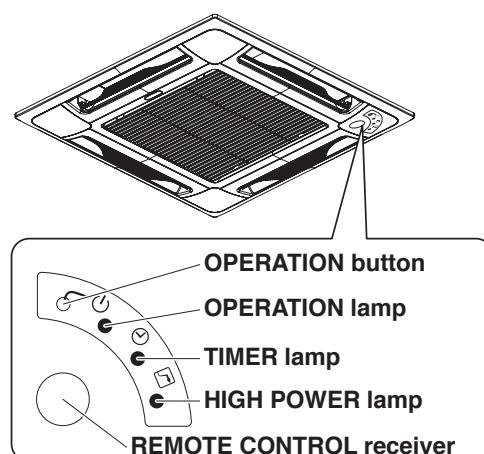
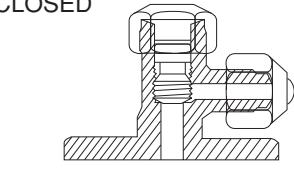
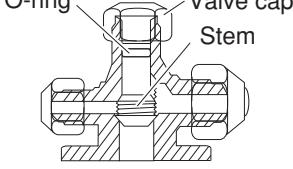
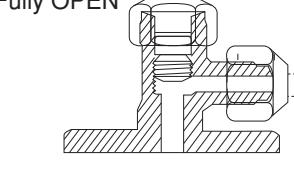
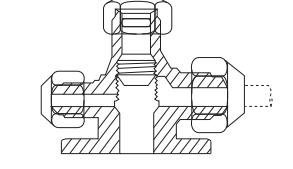
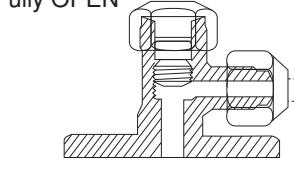
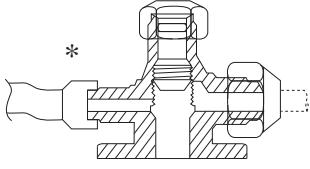
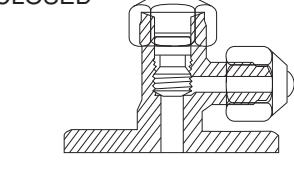
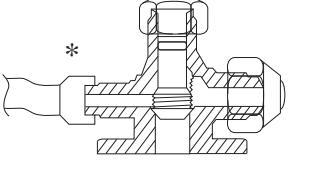


Fig. 31

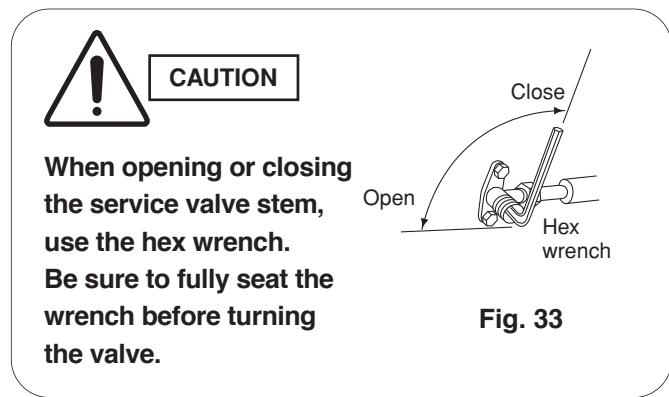
■ Basic Functions of the Service Valves

The basic functions of the service valves are given in Table 7 below.

Table 7

Action	Narrow Tube Service Valve (2-Way)	Wide Tube Service Valve (3-Way)
Shipping	CLOSED 	O-ring Valve cap Stem 
Operating and test running the air conditioner	Fully OPEN 	
Measuring pressure and gas charging	Fully OPEN 	* 
Air purging with a vacuum pump	CLOSED 	* 

* The service port on the wide tube service valve uses a Schrader core valve to access the refrigerant system. Therefore, be sure to use a hose connector which has a push-pin inside. (Fig. 32)



■ Pump Down

Pump down means collecting all refrigerant gas in the system back into the outdoor unit without losing any of the gas. Pump down is used when the unit is to be moved or before servicing the refrigerant circuit.

Pump Down Procedure

Be sure to carry out pump down with the unit in Cooling mode.

- Connect the Lo side charging hose of the manifold valve to the service port on the wide tube service valve.

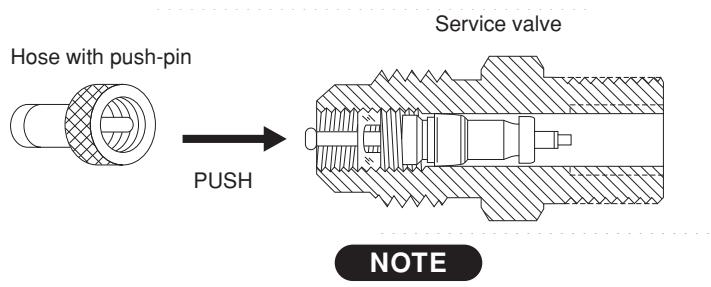


Fig. 32

- Using a hex wrench, turn the narrow tube service valve clockwise all the way to close the service valve. (Be sure to confirm that the wide tube service valve is fully open.)
- Press the operation button and start cooling operation.
- When the low pressure gauge reading falls to 14.2 to 7.1 psi (1 to 0.5 kg/cm²), fully close the wide tube valve stem. Then quickly stop the unit.
- Disconnect all gauges and hoses, and replace the valve caps as they were before.

■ Service Valve Connections

- Temporary connection:
Screw in 3 – 5 turns by hand. (Fig. 34)
- To fasten the flare nuts, apply specified torque as Table 8 and Fig. 35.

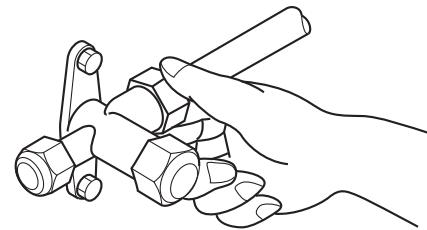


Fig. 34

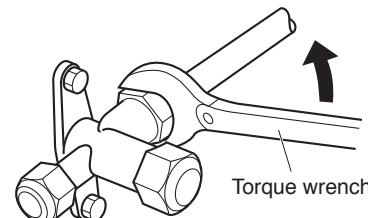


Fig. 35

7. Remote Controller Installation Position

The remote controller can be operated from either a non-fixed position or a wall-mounted position.

To ensure that the air conditioner operates correctly, do not install the remote controller in the following places:

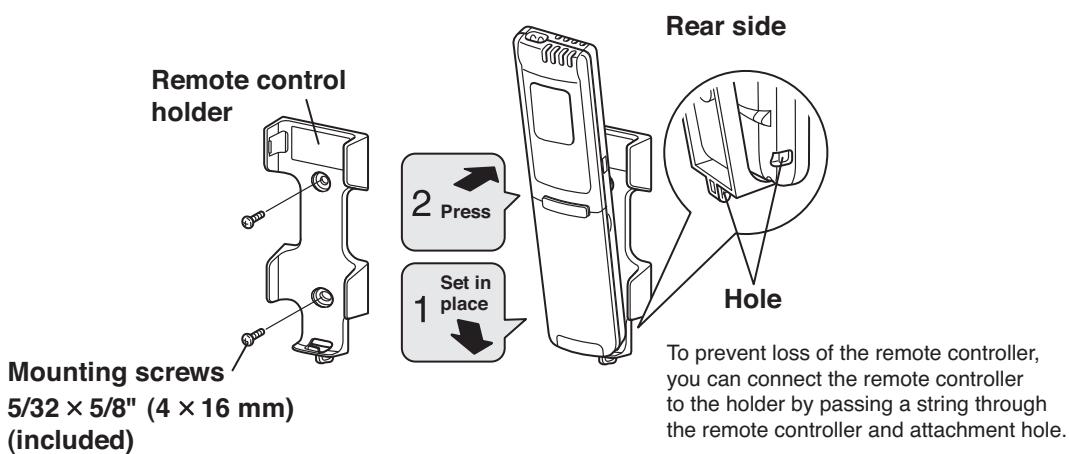
- In direct sunlight
- Behind a curtain or other place where it is covered
- More than 26' (8 m) away from the air conditioner
- In the path of the air conditioner's airstream
- Where it may become extremely hot or cold
- Where it may be subject to electrical or magnetic interference
- Where there is an obstacle between the remote controller and the air conditioner (since a check signal is sent from the remote controller every 5 minutes)



Be sure to tighten the flare nut using the prescribed torque. If the nut is over-tightened, refrigerant leakage may occur.

7-1. Mounting on a Wall

Before mounting the remote controller, press the ON/OFF operation button at the mounting location to make sure that the air conditioner operates from that location. The indoor unit should make a beeping sound to indicate that it has received the signal.



To take out the remote controller, pull it forward.

Fig. 36

8. Address Switch

8-1. Address Setting of the Remote Controller

The address can be set in order to prevent interference between remote controllers when 2 indoor units are installed near each other. The address is normally set to "A." To set a different address, it is necessary to change the address on the second remote controller.

NOTE

Once changed, you cannot restore the original address setting of the air conditioner.

- (1) Switch on the power source.
- (2) Break the address-setting tab marked "A" on the second remote controller to change the address (Fig. 37). When the tab is removed, the address is automatically set to B (Fig. 38).
- (3) Press and hold the remote controller HIGH POWER button and 1HR. TIMER button. Then, press and hold the ACL (Reset) button with a pointed object such as the tip of a pen. After 5 seconds, release the ACL button first, then release the HIGH POWER and 1HR. TIMER buttons. "oP-1" (Test Run) appears, blinking in the remote controller clock display area.
- (4) Each time the 1HR. TIMER button is pressed, the display changes as shown below. Press this button 2 times to change the display to "oP-7" (Address setting). (Fig. 39)

-  - 1 Test run mode
-  - 3 Self-diagnostic mode
-  - 7 Address setting mode

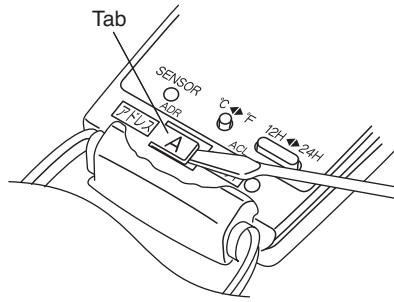


Fig. 37

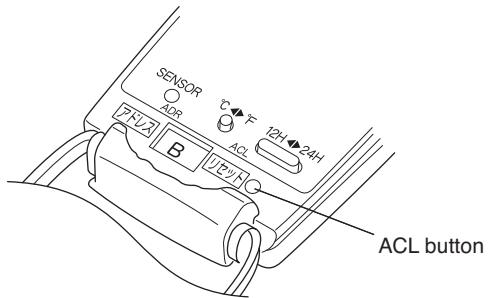
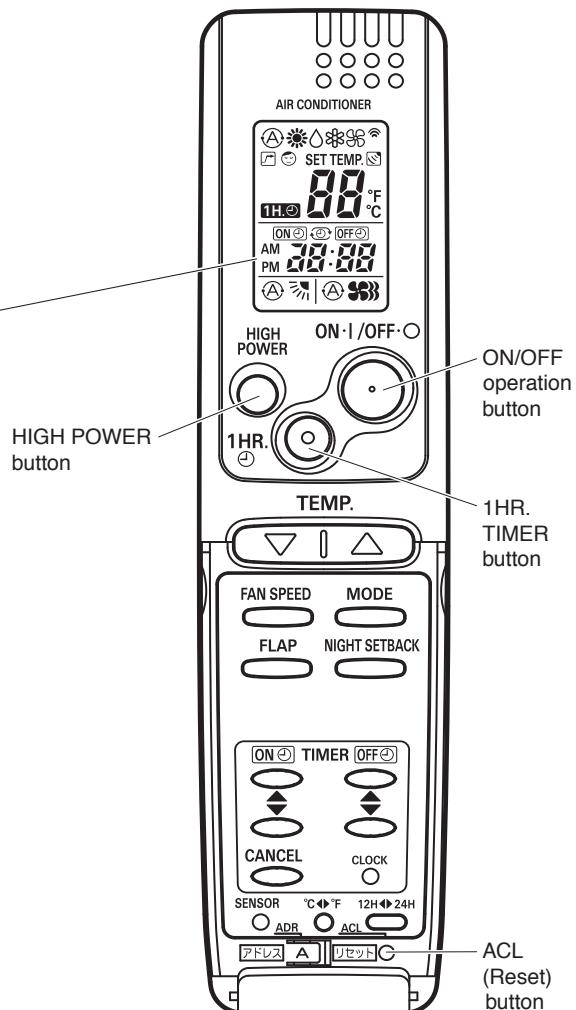


Fig. 38



- (5) "oP-7" has now been selected for address setting.
- (6) Press the ON/OFF operation button on the remote controller. (Fig. 39) Check that the "beep" signal-received sound is heard from the second indoor unit (approximately 5 times). The sound you hear is the signal that the remote controller address has been changed.
- (7) Finally press the remote controller ACL (Reset) button to cancel the blinking "oP-7" display. (Fig. 39)

Changing of the second remote controller address is now completed.

Fig. 39